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that nation with whose commerce, religion, and language they are already acquainted, and it is not irrational to suppose that, by perfectly fair and legitimate means, Christian policy may in time supplant the effete system under which those fertile plains have so long labored, while the present garbled creed professed by the expectant sovereigns, purified by the efforts of earnest and good men, may lose the grosser materialism that pollutes its nature, and, dropping as sediment the foul blasphemies which we have pointed out, rise sublimated into an evangelical faith, held in the hearts and living on the tongues of the millions upon millions of a prosperous, happy, regenerate people.

ART. IX. — *The Positive Philosophy of AUGUSTE COMTE, freely translated and condensed by HARRIET MARTINEAU.* London: John Chapman. 1853. 2 vols. 12mo.

WE are sorry, but not surprised, that Miss Martineau should have adopted the opinions which are avowed in the recent publication of her correspondence with Mr. Atkinson, and in this attempt to translate Comte's Philosophy and to render it popular in England. Her former writings showed considerable ability, but it was the ability of an ill-regulated mind,— of a mind working out of its proper sphere, and scorning all those limitations and restraints which indirectly help us in the search after truth, because they narrow the field of inquiry, and act as preservatives against the most hurtful errors. In her ambition to leave the common track, she has wandered wildly over the whole field of knowledge, and come to the most barren conclusion at last,— to a belief, if it can be called such, that there is no divine superintendence of the affairs of this world, and no hope of a world to come. The leading vice of her character has always been intellectual arrogance. She has never had any deference for man, and now has ceased to entertain any faith in her Creator; the only being whom she has never learned to distrust is herself. The very outset of her career as an author was an unfortunate one for the

growth and discipline of her mental character, however flattering it was to her vanity. Under the special patronage of Lord Brougham, then flushed with exaggerated hopes of the results to be accomplished by the Society for the Diffusion of Useful Knowledge, and proud of the abilities of his "little deaf girl," she undertook to teach the people of Great Britain the abstruse doctrines of Political Economy, mincing up this strong meat into popular tales, so that it might be fitted for the nutriment of babes. Considered simply as stories, her "Illustrations" were very successful; people were amused by them, and paid no heed to the grave lessons which they were intended to teach. As Miss Martineau presumed to treat them like children, they took their revenge by acting like children; they ate the sugar and threw the medicine away. Luckily for them, it was easy to separate the two ingredients, as nearly all the science was condensed into a page or two at the end of the book, and the little that was fairly incorporated into the story did them no harm. What was considered as the most pleasing of her stories, when taken simply as an ingenious fiction in prose, was meant to illustrate and enforce the revolting doctrine of Malthus about population. We hold that it is an impertinence to write fiction for any avowedly didactic purpose, beyond that of inculcating some simple moral, such as the events of real life often teach. In Miss Martineau's attempt, impertinence and pedantry were combined. Her subsequent publications are characterized by the same spirit of arrogant self-conceit, and the same disposition to meddle with subjects which are out of her sphere, and which she is entirely incompetent to discuss.

In one of her books, there is an amusing confession of her weakness in this respect. "That degree of self-confidence," she observes, "which is commonly called conceit, grows in favor with me perpetually." Perhaps so; but as her first publication betrayed an almost incredible amount of this amiable feeling, we hardly see how it could "grow perpetually," without overshadowing by this time her whole mind and character. Her "View of Society in America" is equally a view of our government, our literature, our ecclesiastical institutions, the course of our legislation, and the character of our people. On

all these themes, she favors us with sweeping opinions, delivered in as dogmatic and magisterial a manner, as if the whole Western continent had been summoned before her for a hearing. "The Senate" of the United States, she remarks, "is an anomaly, and an anomalous institution cannot be very long-lived." She will not admit that what appears to her as faulty in theory can possibly succeed in practice. Vainly is it objected that the Senate works well. "The well-working," she replies, is only a temporary affair, — an accident. "Its radical change becomes a question of time merely." The successful experience of sixty-five years, during which time the institution has certainly increased in favor with the people, while the people themselves have more than quadrupled in number, evidently weighs nothing against Miss Martineau's judgment of what is fitting and proper. The Senate is still doomed, and the judiciary are little better off. "The appointment of the judges for life," she remarks in the next paragraph, "is another departure from the *absolute* republican principle." So it is; and for this very reason, those who do not like *absolutism* in matters of government, whether in the form of absolute monarchy, absolute democracy, or absolute anarchy, are strongly attached to the independence of the judiciary. Considering the ease and freedom with which Miss Martineau propounds her opinions upon these very grave subjects, it is much to be regretted that she was not made a member of the last Convention for revising the Constitution of Massachusetts. She would have been quite at home in that body; and nothing in her speeches would have reminded her auditors of her sex. Certainly there is nothing feminine in her books; never was sex more completely discharged from style. She writes like a political economist, like a veteran statesman, like a philosopher, — like anything but a woman. Not an allusion, not an idiom, not a trace of delicacy or faint-heartedness, not even a gleam of fancy or affectionateness, betrays the counterfeit. She borrows Rosalind's language, but acts out her part far better than Rosalind did.

" Were it not better, ...
That I did suit me all points like a man?
A gallant curtle-axe upon my thigh,

A boar-spear in my hand ; and (in my heart
Lie there what hidden woman's fear there will)
We'll have a swashing and a martial outside."

We have no quarrel with Miss Martineau, and no disposition to be very severe upon her errors and her failings, which surely bring with them their own worst punishment. But now that she has assumed to dogmatize upon subjects of the dearest interest to mankind, now that she has begun the career of an avowed free-thinker, and undertaken to teach the world philosophy and infidelity, it becomes a matter of some moment to ascertain what her opinions on these and other subjects are worth, and under what influence she has formed them. Argument can have no effect upon a mind like hers, for she has never been accustomed to reason, but only to pronounce judgment. Her opinion as to the truth of the Christian religion rests on about as much evidence, even in her own mind, as the assertion coolly made by her, seventeen years ago, after she had had an opportunity to become acquainted with perhaps one American clergyman out of a thousand, and to converse familiarly with probably half a dozen of them,—that "the American clergy are the most backward and timid class in the society in which they live, the least informed with true knowledge, the least efficient in virtuous action." If Miss Martineau is not in her own opinion inspired, how was she enabled to speak thus confidently of the characters, and the results of the labors, of a very numerous class of men, scattered all over the United States, of whose very names, with perhaps a dozen exceptions, she was entirely ignorant? We are tempted to retract what we have just said about her success in suppressing all moral and intellectual tokens of her sex. She does betray a slight feminine weakness,—one that would be expected, however, only from women of inferior cultivation,—in using very strong language without any apparent consciousness of its strength of meaning, and in an unhesitating expression of very hasty judgments.

Miss Martineau's correspondence with Mr. Atkinson is chiefly curious as an illustration of the old remark, that the provinces of infidelity and excessive credulity are separated only by a thin partition. "Unbelievers," says Pascal, "are

the most credulous persons in the world; they believe the miracles of Vespasian, in order not to believe those of Moses." Mr. Atkinson and his fair correspondent go one step farther; they accept the marvellous reports of mesmerism and *clairvoyance* as a reason for discrediting both the life and the doctrines of our Saviour. Such persons are properly incompetent to enter a jury-box; for they are incapable of weighing the force of testimony. Their estimate of what is marvellous and incredible is not objective, but subjective; what is new *to them*—that is, what has been recently reported, though it may not be very marvellous *in itself*—excites their wonder to a far greater degree than that which is intrinsically much more mysterious, but which they have so often heard of and talked about that it has ceased to surprise or interest them. The best illustration of this state of mind is the story told of the good old lady, who, when her sailor son was reporting to her the marvels he had seen, flatly refused to believe his story about the flying-fish, but saw nothing incredible in his statement that, when his ship was in the Red Sea, the sailors found, on weighing the anchor, that they had drawn up also one of Pharaoh's chariot-wheels. This worthy matron, indeed, not having a turn for philosophizing, followed the natural principle of belief, by regarding what seemed to her most wonderful as least deserving of credit. But Miss Martineau, wise as an owl, inverts the laws of credibility; it is precisely because the silly fables of mesmerism appear to her more strange and unaccountable than the miracles recorded in Scripture, that she is bent upon believing the former and rejecting the latter. Properly speaking, then, she is the credulous person, while the sailor's mother was comparatively slow of belief. The relative weight of testimony in the two cases—the only ground of rational judgment—is just what neither of the two women was capable of estimating. The blunders of pedantry are often more amusingly absurd than those of simple ignorance.

The Preface to this translation of Comte's Philosophy is written in the defiant and contemptuous tone which appears so often and repulsively in the author's former publications. She is perfectly aware that the doctrines of the work will be painful and shocking to many who are incapable of estimating

its scientific merits. But she has no milder terms with which to characterize their feelings than "hate," "intolerance," "theological selfishness or metaphysical pride." One of the parties in the case certainly manifests intolerance, but Miss Martineau is perfectly unconscious that it might be charged upon herself, though she knows that the principles of Comte may be accused of "irreverence, lack of aspiration, hardness, deficiency of grace and beauty, and so on." No matter for such charges, or for the feelings of the persons who make them; "they are no judges of the case." None are judges but "those who have passed through theology and metaphysics, and, finding what they are now worth, *have risen above them*," — in which happy class Miss Martineau places herself. She could not have defined more clearly the requisites for becoming a disciple of the "Positive Philosophy." One must trample both theology and metaphysics under foot before he is capable of appreciating its claims. This is what the writer of the Preface has accomplished; she has got beyond all religious faith by first divesting herself of all womanly feeling. It is precisely because she is an "unsexed thing," that she has learned how to "scorn her God."

But we gladly pass from the translator to a very brief consideration of the claims of the work which she has translated. The general scope of the "Positive Philosophy" is clearly enough indicated in the remark which Sir William Hamilton recently quoted from its author, M. Comte.

"To those unfamiliar with a study of the celestial bodies, astronomy has still the character of being a science preëminently religious; as if the famous text, 'The heavens declare the glory of God,' retained its old significance. But to minds familiar with true philosophical astronomy, the heavens declare no other glory than that of Hipparchus, Kepler, Newton, — in a word, of all those who have aided in establishing their laws."

To one immersed in mathematical calculations, and habituated to disregard all those aspects and phenomena of nature which do not admit of being reduced to numerical expressions and algebraic formulas, this remark may seem plausible. If nothing is real but what can be counted, or measured by a foot-rule, — and nothing else can be a subject of mathematical

investigation, — then there is nothing more marvellous in the revolutions of the heavenly bodies than in the regular movements of the hands over the dial-plate of a clock. Nay, the heavens themselves are but a gigantic clock, the only use of which is to tell the mariner his longitude, or the astronomer the exact time of day. But as a rational curiosity is not satisfied with merely learning the hour from a time-piece, or with the ability to predict, though with unerring precision and nicety, the exact position of the hour, minute, and second hands, after any interval of time, — as man insists upon knowing also *how* the hands are made to move, and *why*, or to what purpose, — so all that mere calculation can teach appears unprofitable and insufficient. Even the child is not satisfied with seeing that his little mechanical toy works well and regularly, — that it nods, or cries, or lifts its arms or its feet just as he draws the cord or presses the spring; he insists on pulling it to pieces, that he may find out *how* it moves, or *why* pressure causes it to sound. So, also, to the enlightened and comprehensive mind, the heavens still appear enveloped with wonder and mystery; and mere mathematical calculators, like Lalande and Laplace, have not succeeded in raising even a corner of the veil. “The infinite spirit,” says Fries, “does not limit itself under proportion and number. The play with number is an easy play; its joy is only the joy of the imprisoned spirit at the clank of its fetters.”

In this brief illustration, we catch a glimpse of the whole scope and tendency of the “Positive Philosophy,” and also of its essential insufficiency and weakness. M. Comte has endeavored to extend the principles and the limitations of mere physical science over the whole field of human knowledge, and thus to pluck up metaphysics and theology by the roots. Starting from the acknowledged fact, that, in the material universe, we are never able to detect the *nexus* of cause and effect, but are properly confined to the observation and generalization of phenomena, he attempts to get rid of the doctrine of efficient and final causes altogether, and thus to reduce mind to matter, life to organization, freedom to necessity, and to construct a soulless and godless universe. Strictly speaking, then, the system is not a “philosophy” of any sort, but

an attempt to destroy and eradicate philosophy altogether. It is not new even to the British public, as Miss Martineau seems to imagine. About ten years ago, one of the ablest thinkers of the day, Mr. John Stuart Mill, took it up and expounded it with great clearness and precision, in his *System of Logic*. In Mr. Mill's hands, it became simply a scheme of Inductive Logic, and an application of such logic to social science, or to an investigation of the laws which determine the condition and the progress of society. In this form, indeed, it did not attract extensive notice, because it constituted but one department of Mr. Mill's great work, and the ability with which the other portions were executed, together with their unexceptionable character, caused most persons to overlook this needless and offensive adjunct. As thus expounded, however, it was rendered far less repulsive and objectionable in appearance than when first promulgated. Mr. Mill respected the feelings or the prejudices, — call them what you will, — which he felt constrained to wound. He did not follow out the system to its remotest logical consequences, and while endeavoring to palliate or cover up some of the conclusions from it which would shock the public, he probably succeeded in concealing them even from himself. M. Comte and his present translator are far from sharing either his scruples or his delicacy. It must have been from harmony of temperament and moral character, as well as from coincidence of opinion, that Miss Martineau felt attracted towards the author of the *Positive Philosophy*, and impelled to become the expositor of his doctrines to the English public. For dogmatism and conceit, M. Comte is unrivalled by any philosophical writer we have ever read, with perhaps the single exception of Hobbes. We extract a few sentences from Miss Martineau's translation, to justify this remark: —

“If a comparison were fairly established between the first and last terms of the scale of sciences, I will venture to say, that sociological science, though only established by this book, already rivals mathematical science itself, not in precision and fecundity, but in positivity and rationality.” — Vol. II. p. 516.

“This last effort alone, therefore, is thoroughly effectual in destroying the absolute philosophy; and *if it were possible that I could be mis-*

taken as to the true law of human development, the only inference would be that we must find a better sociological doctrine; and I should still have constituted the only method that could lead to positive knowledge of the human mind, regarded henceforth in the whole of its necessary conditions." — p. 518.

"By the review of the former social states of mankind, and the sketch of the future organization of society which I have now completed, I trust I have fully redeemed my promises, as offered both at the beginning of this work, and at the outset of the sociological portion. At a time when moral and political convictions are fluctuating for want of a sufficient intellectual basis, I have laid the logical foundation of firm convictions, able to withstand discordant passions, public and private. At a time when practical considerations are excessively preponderant, I have restored the dignity of philosophy, and established the social reality of sound theoretical speculations, by instituting a systematic subordination of the one to the other, such as is essential to social stability and greatness. At a time when human reason is liable to be frittered away under an empirical system of dispersive speciality, I have announced, and even introduced, the reign of the spirit of generality, under which alone a universal sentiment of duty can prevail. These three objects have been attained by the institution of a new science, the last and most important of all, which is as positive and logical as any of the other sciences I have treated of, and without which the system of true philosophy can have neither unity nor substance. The future progress of sociology can never offer so many difficulties as this original formation of it; for it furnishes both the method by which the details of the past may serve as indications of the future, and the general conclusions which afford universal guidance in special researches. This scientific foundation completes the elementary system of natural philosophy prepared by Aristotle, announced by the scholastics of the Middle Ages, and directly proposed, in regard to its general spirit, by Bacon and Descartes." — pp. 495, 496.

One is naturally curious to know something of the life and character of the man who has contrived to rid himself so completely of all feelings of humility and self-distrust. In what he calls a "personal preface," prefixed to the sixth and last volume of the original work, and occupied chiefly with some very bitter remarks upon the conduct of MM. Arago, Poisson, and other eminent French *savans*, whom he accuses of jealousy and of intrigue to obstruct his professional advancement,

M. Comte gives some curious details concerning himself. Born in 1798, in the South of France, of a family strongly attached to Romanist and monarchical opinions, he was educated at one of those lyceums established by Napoleon, for the vain purpose, as Comte affirms, of attempting, at great expense, to restore the old preponderance of the metaphysico-theological system. Before he had attained his fourteenth year, he had passed through what he terms the necessary cycle of opinions, having first embraced religious dogmas, then abandoned theology for metaphysics, and finally found a resting-place from metaphysical speculations in positive science. This course of necessary preparation for his future career was hastened by the revolutionary fever which then prevailed in France, and under the further influence of which he was enabled to perceive the necessity of a total renovation of political and philosophical systems, or, in other words, of creating a new and universal philosophy for himself and for mankind. As his education was completed at the Polytechnic School, where an early taste for mathematical studies was fully gratified, he found in mathematical science itself at once the starting-point and the leading feature of his new system, — perfectly clear ideas and positive convictions. For a while, the natural development of his own opinions was impeded by his falling under the influence of the celebrated Saint-Simon, whom he characterizes as a very ingenious but superficial writer, of a temperament which was rather active than speculative, and of immense personal ambition. But he soon quitted Saint-Simonianism, and quarrelled with its founder, whom he accuses of making envious insinuations against the originality of his own early efforts in political philosophy. He magnanimously undertakes, however, to relieve the memory of this philosopher from some accusations that have been brought against him at the close of his career, by saying that he “had only been able to observe in him, after the weakness caused by a fatal attack of disease, *that vulgar bias towards a vague religious sentiment (religiosité), which is so often derived in our day from a secret feeling of the impotence of philosophy, in minds which undertake the regeneration of society without being properly prepared for the task by their own mental renovation.*”

The development of Comte's system, after the outlines of it had been completed in his own mind, was delayed, in 1826, by an attack of mental disease, from which, if it had been left to take its own course, he thinks he should have speedily recovered. But he was unhappily placed in a private institution for the insane under the charge of the celebrated Esquirol, where the treatment soon reduced him to a state of complete mental alienation. After his case had been pronounced incurable, however, the native vigor of his constitution, aided by affectionate domestic care, got the better both of the disease and the doctors; and before eighteen months had elapsed from the commencement of the attack, he made good use, as he boasts, of the sad experience he had obtained, by applying it, in a public journal, to a criticism of the celebrated work of Broussais on "irritation and insanity." With his usual ill-temper, he goes on to attribute to the malice of his enemies in the mathematical circle of *savans* the report which had been circulated that his disease had never entirely left him;—and to say the truth, the extraordinary tone of this "personal preface," not to speak of other portions of the work, lends some plausibility to this rumor. To imagine that the whole scientific world are jealous of the success of a work which with difficulty found a publisher, and which, though the first volume appeared in 1830, has not yet, we believe, reached the honors of a second edition, and to suppose further, that all the theologians and metaphysicians are leagued with the *savans* in persecuting its author, is quite enough, we should think, to constitute a case of mental hallucination.

We shall not enter into any detail with respect to M. Comte's personal grievances. He early obtained a very subordinate situation as instructor in the Polytechnic School, and the income of the post not being sufficient even for his modest wants, he was obliged to eke it out by giving private instruction in mathematics, so that very little leisure remained to him for the elaboration of his great philosophical work. The sole burden of his complaints is, that he has failed to obtain promotion, notwithstanding his eminence as a mathematician and a philosopher. In 1836, he became a competitor for the office of first Professor of Mathematics in the School; but the

chair was given, through the influence of Arago, to M. Sturm. When Guizot first entered the French ministry, Comte solicited him to establish, for his benefit, a new professorship in the College of France, to teach the history of the positive sciences; and when the request was not granted, Comte attributed the refusal to metaphysical spite, and published an outrageous attack, which the stoical minister passed over without notice. In spite of all his efforts, therefore, M. Comte remained, down to 1842, a mere tutor (*répétiteur*) and examiner in the Polytechnic School, the higher honors and rewards of science being beyond his grasp. He had probably earned promotion by the mere extent of his mathematical attainments; for it would be idle to deny that his work contains marked evidence of ability in this respect. But it is not strange that those who had the control of the School should hesitate about giving a principal office in it to one who had manifested so arrogant and quarrelsome a disposition, and whose perfect sanity was still questioned.

It is with the tastes and the acquired habits of a mathematician, then, that M. Comte comes to a review of the history, the logic, and the processes of the positive sciences. The bias under which he thus labors might have been detected from internal evidence in the work itself, without any previous knowledge of his circumstances. He manifests in the most glaring manner the peculiar weakness of mind, and the special errors in speculation, which, according to Hamilton and many other high authorities, an exclusive devotion to mathematical pursuits is apt to engender. The mathematician deals solely with a kind of reasoning which does not admit of doubt or degrees, which is infallible, and therefore inapplicable to any of the ordinary concerns of life. Resting solely upon demonstrative evidence, perceiving that his conclusions are absolutely certain, though they may depend upon a chain of reasoning which none but a thorough-bred mathematician is able to follow, he regards with impatience and contempt the hesitation or total disbelief which may still cling to the minds of the vulgar. Thus he is prone to overweening presumption or incurable arrogance. Carrying his own peculiar logic along with him whenever he quits the territory of the exact sciences,

he commits the enormous blunder of requiring the evidence of intuition or demonstration where only probable testimony can be had, and is thus often led to reject truths which are familiar to common sense and level to the comprehension of a child. "Those who have studied mathematics much, and no other science," says Lord Monboddo, "are apt to grow so fond of them as to believe that there is no certainty in any other science, and no other axioms than those of Euclid." They even come to trust the results of mathematical analysis in preference or in opposition to the primitive dictates of their own common sense, or the universal principles of all belief; and thus humble their own reason before the special instrument or tool which their reason works with. "This is contrary to all experience," says Euler, "and yet it is true." They are especially prone to reduce all things to mechanism, because only mechanical results are mathematically calculable. Whatever is contingent or problematical must be eliminated by hypothesis from the premises, before the conclusion can be mathematically deduced. Thus, taking the two branches of an alternative, the algebraist can determine with absolute certainty the results of either, when regarded separately or without reference to the other; and having done this, he is just as incapable as ever of deciding between them, unless he will allow the evidence of perception, experience, common sense, or some other non-mathematical criterion of truth, to decide as to the relative value of these results. Busied exclusively with the phenomena of matter and the idea of necessary connection, he banishes mind and free-agency out of the creation, and constructs a mechanical and soulless universe. The very title of Laplace's great work, the *Mécanique Céleste*, suggests the reason of his infidelity; he thought he had reduced the solar system to a vast machine, which is self-perpetuated, and therefore, if no extraneous cause intervened, would run on for ever.

We do not mean that these unhappy results of mathematical studies are inevitable, or that minds of a higher order, like Pascal, Newton, and Leibnitz, cannot rise above them. Unquestionably, the philosophical faculty, or the power of grasping at once both necessary and contingent truth, and of ap-

plying to each its appropriate *organa* of investigation and tests of truth, may coexist with great dexterity and abundant experience in mathematical calculation. But it cannot reasonably be doubted that the general tendency of such pursuits is what we have pointed out, and that mere mathematicians, like Halley, Laplace, and Comte, are incapable of resisting that tendency. No better evidence of the truth of this assertion can be found, than in the principles, the reasoning, and the conclusions of this very work on "Positive Philosophy."

In constructing what he calls "the hierarchy of the sciences," to take the place of the classifications proposed by Bacon and D'Alembert, which are founded on the faculties of the mind that are respectively called into play by these sciences, M. Comte gives the first place to mathematics, and makes it "the point of departure of all education, whether general or special." He regards mathematics "less as a constituent part of natural philosophy, than as having been, since the time of Descartes and Newton, the true basis of the whole of natural philosophy." In other words, measurement and enumeration are the only means of knowledge, and what can be measured and calculated is all that man can know. Teach the youthful mind first to measure and calculate, and you have put it upon the way to obtain all attainable truth. This is the doctrine of the "Positive Philosophy" in a nutshell.

Next in the hierarchy of the sciences comes astronomy, as the most simple and abstract, and therefore the most general of all, so that it affords the clearest field for the application of mathematical analysis. Physics deals with more complex phenomena, and the laws which govern them are of inferior generality; these laws are subject to the great law of gravitation, but do not extend to the motions of the heavenly bodies, which are solely under the dominion of the most general law that is known to man. One step lower in the scale is chemistry, which deals with still more complex phenomena and more circumscribed laws,—laws affecting the subjects of all the sciences inferior to itself, but not extending to those of any higher degree. These three, astronomy, physics, and

chemistry, in the order in which they are enumerated, are the three fundamental sciences of the inorganic world. Organized bodies are the subjects of two other sciences, biology and sociology, or the science of life and the science of society. Here the phenomena are extremely complicated, and the laws which govern them are of the lowest degree of generality, — those of sociology, for instance, which is at the bottom of the scale, not being applicable in either of the four antecedent sciences, while the successful study of them must depend upon a knowledge of all the laws established in the four superior branches. Here we have, then, not only a natural order of the sciences, but the order in which they must be successively investigated. “Physical philosophers cannot understand physics without at least a general knowledge of astronomy; nor chemists, without physics and astronomy; nor physiologists, without chemistry, physics, and astronomy; nor, above all, the students of social philosophy, without a general knowledge of all the anterior sciences.” This classification also points out the relative perfection of the different sciences; for, as already remarked, mathematical analysis becomes less and less applicable, as we descend in the scale. These five, with mathematics, which stands at their head, are the only possible branches of human knowledge. Metaphysics, or the science of mind, is a delusion; politics and ethics, except so far as they are deductions from sociology, are mere blunders; and theology is a dream.

All the positive sciences have passed, or are passing, through three successive stages, which also constitute three distinct epochs, both in the history of every individual mind and in that of humanity. In the first, or *theological* stage, man endeavors to pry into the real essence of things, or to know both their efficient and their final causes; — in other words, he tries to ascertain *how* they came into being, and *why*, or for what purpose, they exist. Absolute knowledge is here aimed at, and all events are referred to the action of supernatural beings. In the second, or *metaphysical* period, events are referred, not to beings, but to metaphysical entities or abstractions, and what is called an explanation of the phenomena is only a reference of each to its proper head. Thus,

certain appearances are attributed to gravitation, certain others to electricity, and still a third class to chemical affinity,—under the delusive belief that these names respectively denote distinct, real forces or powers, each of them having its appropriate effects. The most general attribution of this sort is that of substituting one great abstraction, Nature, for the multitude of entities at first supposed. In the third, or *positive* stage, these names are recognized as denoting nothing more than abstractions, or fictions, as the phenomena which have been attributed to each of them are classed together only on account of their similarity to each other in certain respects, and not because anything is known about the cause from which they all proceed. According to this view, causes are incognizable, and are therefore no proper objects of investigation. When two phenomena are attributed to gravitation,—as for instance the falling of a stone and the revolution of a planet,—it is not because any thing has been ascertained respecting the cause of either of them, but because their motions are found to be similar, or each of them is an instance of the general fact, that any two bodies tend to fall towards each other with a force which is directly as their masses and inversely as the squares of their distances. Generalization of facts, not the ascertainment of causes, is the sole business of science.

The regular succession of these three epochs, as has been said, is a point in the history of each science, of each individual mind, and of the whole human race. When man first comes to the study of nature, ignorant of everything and surprised at everything, he refers every change that he witnesses to the agency of some personal cause,—of some being exterior to nature. Gradually enlightened by successive discoveries of uniformities of succession and coexistence, which lead to the classification of facts, he contrives a system of what may be called *secondary* causes, or forces in nature, and in the contemplation of these gradually loses sight of the ultimate and primal causes which he had originally imagined. Advancing still farther, he learns that even these causes are fictions, arising from the substitution of a cause where only an effect had been actually perceived. He thus receives a necessary lesson of humility,—to confine his researches

henceforth to the actual phenomena before him, seeking only to observe and classify these according to their most intimate and natural relations, and giving up the vain attempt to investigate their origin and their purpose. And here, at last, he enters the domain of *positive* science.

A like series of opinions and events may be seen in the history of the race,—more slowly evolved, indeed, but yet distinctly traceable by the light of the principles now advanced. Society has a life and a principle of growth and development of its own, wholly independent of the individuals who compose it, all of whom pass away with the generation to which they belong; the leaves decay and fall at the close of each season, but the parent trunk, with its branches, rises and expands with a continuous growth for many years. We may observe the laws of development in both cases,—in the short-lived leaf and in the time-honored trunk. In the earlier ages of society, religious ideas predominate, as, indeed, men could not be kept in order and subjection without them. Under the doctrine of a superintending Providence, all vicissitudes in the progress and well-being of a particular society are attributed directly to the favor or anger of the gods. But as knowledge advances, not only do men become impatient of this species of tutelage, which is, in truth, an arbitrary rule, a government of mere will or caprice, but they learn to attribute the prosperity or adversity of states to causes within their own control, and thus to strive after progress and self-government. This is the critical or metaphysical stage; and the struggle between the ideas developed in it and those which are peculiar to the theological epoch creates the political and intellectual anarchy which now exists in civilized Europe, and which must continue till sociology is developed into a complete science, and men learn to regulate their conduct simply by observance of the natural laws to which the movements of society, as a whole, are subject.

The system of Positive Philosophy, as here explained, is developed and applied by M. Comte, in the six thick octavos of the original work (here condensed by Miss Martineau into two), in a review of the history and characteristics of the sciences, and of the history of the human race,—this last being

the foundation of the new science of Sociology. This review is an able, and, in many points, an instructive one. All those portions of it which are peculiar to M. Comte's own theory might be entirely omitted, without even injuring the connection of what is left; and the remainder would be a clear and accurate view of the relations of the physical sciences to each other, of the peculiar logic of those sciences, and of the opinions and methods, the prevalence of which, at different times, has retarded or hastened their growth. Leave out all "the Positive Philosophy" so far as it is original with M. Comte, and the work will be a very good one. The leading and fatal error in it, so far as it is a novel scheme, we have already pointed out; it consists in an attempt to survey the whole field of human knowledge from a mathematical point of view, to determine the relative value and perfectibility of the different sciences by the various degrees in which they admit of mathematical analysis, and to exclude all subjects of investigation which we cannot count or measure. The work thus illustrates the broad admission of D'Alembert, himself an eminent geometer and analyst, that a mathematician is essentially unqualified for metaphysical speculation. M. Comte comes out with a petty measuring-tape, wherewith to ascertain the boundaries of the universe and the limits of human knowledge. Whatever does not conform to this single standard, or cannot be circumscribed by these means, is rejected as no proper object for farther study. Every shallow that cannot be sounded by a ten-foot pole is unfathomable; every problem that cannot be reduced to an equation is insoluble.

M. Comte even commits the egregious error of estimating the value of a science merely by the precision and certainty of its results, however narrow the range or limited the application of these results. No matter how shallow the brook may be; so long as he can see clearly through its waters, so as to number and measure every pebble in its bed, it is to him a far more fitting subject of contemplation and study than the broad and deep river, which winds its way majestically through a thousand leagues of country, and opens at last into a boundless sea. Its source may be as undiscoverable as that of the Nile; its volume of waters defies computation; and its vast

breadth cannot be spanned by any bridge. The Positive Philosopher, therefore, turns away from it "with dignified humility," and goes to fishing for minnows in a duck-pond.

This is satire, and it may appear like extravagant satire; but we cannot otherwise express the magnitude of our author's blunder. Take his view of astronomy, for instance, which is to him a perfect science, and which he places next to mathematics in the hierarchy of the sciences. "The general laws of astronomical phenomena," he remarks, "are the basis of all our real knowledge." The perfection of a science depends on its success in reducing all the phenomena with which it is concerned to a single law; "and, according to this test, astronomy distances all other sciences." Not less important is its influence on our intelligence; for "we have seen how this science must operate in liberating the human intellect for ever from all theological and metaphysical thralldom, by showing that the most general phenomena are subjected to invariable relations, and that the order of the heavens is necessary and spontaneous."

While thus expatiating on the glories of his favorite science, M. Comte seems to have entirely overlooked one fact, which might have convinced him of the hollowness of his pretensions. Astronomy is a very finished science only because it is very limited in its objects. It contemplates nothing but forms, motions, and positions. Of the physical constitution of the celestial bodies, even when our view is confined to those in our own solar system, we are profoundly ignorant; we form a few faint guesses about the nature of the irregularities on the surface of the moon, and there we stop. Of the external and internal economy of the heavenly orbs, of the forms which organized matter there assumes, the modes in which active energy develops itself, and the living races, if any, which tenant them, we are so far from knowing anything that we do not even pretend to study them. Our idea of the mechanism of the heavens falls almost immeasurably short of the truth of things. The astronomer knows so accurately only because he assumes to know so little. And even the boasted precision of his knowledge is only relative. Angular distances and variations may indeed be pre-calculated, and,

through the exquisite nicety of our instruments, may be actually observed, to the fraction of a second; but owing to the great absolute distance of the bodies calculated or observed, this fraction of a second may correspond to thousands, or even to millions, of miles. Absolute astronomical measurements make no pretensions to great accuracy; the most important distance of all, that of the earth from the sun, is not certainly known within one or two millions of miles. Notwithstanding the boasted triumphs of science in this department, therefore, the truly philosophical observer, seeing how vastly the subject still transcends the human intellect, instead of imitating the vanity of Laplace and Comte, will say rather, with the Psalmist of old, "When I consider thy heavens, the work of thy fingers; the moon and the stars, which thou hast ordained; what is man, that thou art mindful of him? and the son of man, that thou visitest him?"

Contract the sphere of any other science to as narrow limits as those which inclose the objects of astronomy,—take only the easiest problems in it, even those which, on account of their obviousness, are usually put aside as unworthy of study,—and physics, chemistry, or even physiology, may be made to rival in precision and certainty our knowledge of the solar system. Comte does not perceive that he is enabled to see clearly only on account of the shallowness of the waters. He recognizes the fact, indeed, that they *are* shallow; for he says, "The analysis of the simplest terrestrial phenomena, not only chemical, but even purely mechanical, presents a greater complication than the most compound astronomical phenomenon; the most difficult astronomical question involves less intricacy than the simple movement of even a solid body, when the determining circumstances are to be computed." Nature helps us to calculate by simplifying the phenomenon. Friction and a resisting medium are eliminated by the nature of the phenomenon; and even the most complicated case which we have to consider—the gravitating effect of different bodies on each other—is practically reduced to the problem of only *three* bodies,—the sun, the nearest planet or satellite, and the body the disturbed motion of which furnishes the problem. Comte recognizes the simplicity, but does not seem

to perceive that this simplicity is the sole cause of the boasted accuracy, or that the conclusion is really as narrow and meagre as the premises are simple.

And here, too, we have a striking illustration of the weakness and narrowness of range of M. Comte's favorite organon of investigation and test of truth,—mathematical analysis. Astronomical science has an eminently mathematical character; “there is perhaps no analytical process,” says our author, “no geometrical or mechanical doctrine, which is not employed in astronomical researches, and many of them have as yet no other aim.” It is precisely because there is so little to be done, and even so little to be attempted, that mathematical analysis in this case succeeds so perfectly. M. Comte's measuring-tape answers admirably when he has only very petty and very simple forms to take the dimensions of. Contract the field of inquiry in the other sciences to a span,—leave out all that is complicated and difficult in them,—and he will be able in them also to measure and calculate to his heart's content, and with marvellous precision.

Our readers must not suspect us of the folly of running a tilt against mathematics, or attempting to disparage the claims of astronomical science. Within their proper sphere, their triumphs are striking and indisputable. Few achievements of the human intellect affect the imagination so strongly as those of Euclid and Hipparchus, of Newton and Leibnitz. It is only when the votaries of these sciences attempt to use them as the groundwork of a shallow and infidel philosophy, that the hollowness of their pretensions for such a purpose may be fairly exposed. When it is asserted that the heavens do not declare the glory of God, but of the mathematicians and astronomers, it is competent for us to reply, that the grandeur of astronomical science, after all, depends far more on the sublimity and perfectness of the objects of study, than on the ability and success with which they have been studied. The wonder is not so much that man should be able to foresee the return of an eclipse, even to a second of time, as that the arrangement of the vast system of worlds should be so perfect, and their mutual action and dependence so accurately balanced, that the cycle should be perfectly preserved, the two

bodies returning from their vast journeys through the immeasurable depths of space at the precise moment, and to the previously defined point in the heavens.

"Through all starry changes," says Comte, "the translations of our planets present the almost rigorous invariableness of the great axes of their elliptical orbits, and of the duration of their sidereal revolutions; and their rotation shows a regularity even more perfect, in its duration, in its poles, and even, though in a somewhat smaller degree, in the inclination of its axis to the corresponding orbit. We know, for instance, that, from the times of Hipparchus, the length of the day has not varied the hundredth part of a second. Amid all this general regularity, we perceive a special and most marked stability with regard to the elements which are concerned in the continued existence of living beings." — Vol. I. p. 205.

And what is the reflection with which our philosopher concludes this summary view of the marvels of the planetary universe? If he will not give God the glory for them, surely he will spend some words in admiration of the sublime effects thus produced, though by an unknown and inscrutable cause. But no; he can admire nothing except the ability of man to perceive and record the marvel which is thus placed before him.

"Such," he continues, "are *the sublime theorems of natural philosophy, for which humanity is indebted* [to whom, in Heaven's name?] *to the sum of the great works executed in the last century by the successors of Newton*!"

The chief reason that M. Comte finds for denying that a Deity governs the universe, or has ever revealed himself to man, is the prevalence of what is called *the laws of nature*.

"Theological philosophy," he says, "supposes everything to be governed by will; and that phenomena are therefore eminently variable and irregular,—at least virtually. The Positive Philosophy, on the contrary, conceives of them as subjected to invariable laws, which permit us to predict with absolute precision. The radical incompatibility of these two views is nowhere more marked than in regard to the phenomena of the heavens; since, in that direction, our prevision is proved to be perfect. The punctual arrival of comets and eclipses, with all their train of minute incidents, exactly foretold, long before, by the aid of ascertained laws, must lead the common mind to feel that such

events must be free from the control of any will, which could not be *will*, if it was thus subordinated to our astronomical decisions." — Vol. I. pp. 175, 176.

Whatever tendencies to scepticism are found among the students of physical science at the present day — and it must be confessed that they are numerous and alarming — are probably attributable to the reasoning here stated. Naturalists, physicists, and chemists, as well as astronomers, have a vague notion that *moral government* is incompatible with the prevalence of fixed and permanent *natural laws*. We call the notion a vague one, because most of those who are conscious of the difficulty cannot point out precisely what constitutes it, or even give a definite and fixed significance to that much abused phrase, "the laws of nature," on the precise meaning of which the whole point of the reasoning depends.

A law of nature properly means the regular—even the invariable—recurrence of phenomena of a certain class; it has nothing whatever to do with the true cause of those phenomena. But when one of these laws is ascertained, — and it is the sole business of physical science to discover and determine or exactly define them, — then it is loosely or figuratively said, that the phenomenon is *caused* by that law, or *produced* by it, or *necessarily happened* on account of the law. Neither of these expressions is strictly correct, and each of them is apt to lead to a false inference. What is called the *law* is only a *general fact*, ascertained by induction; and the phenomenon is only a particular instance, or example, of that general fact. To attribute a particular event to a law of nature is only to classify it with certain other events, so similar to it in character that they may all be simply and conveniently comprehended under one general statement. The event is then properly subsumed, or *ranked under* the law, and not caused by it. And because the event is so classified, it is not properly *accounted for*, or explained; for the other phenomena thus classed along with it may be equally and totally inexplicable. Neither did the event *necessarily happen* on account of the law. There is no necessity in the case. The law itself is only a truth of induction; it is not necessarily true in all cases. We have only assumed that it always *will* hold true, because,

in all the instances hitherto observed, it always *has* held true. The law, then, does not *govern* or *control* any of the cases subsumed under it. In the case of any particular phenomenon, moreover, we are not sure that it is rightly subsumed under the law ; similarity with the other phenomena ranked under this head is the only ground of such subsumption, and we can never be sure that the similarity is perfect in the very circumstances that are required.

So far, then, we agree with M. Comte ; indeed, the doctrine which we have now attempted to explain is the very foundation-stone of the " Positive Philosophy." But when he comes to argue against the doctrines of theology, — or rather to cast a slur on them, for on this subject he seldom argues, — then he forgets his own principles. Then, he maintains, events cannot be governed or controlled by the Deity, because they are governed by natural laws. Then, events cannot be contingent, cannot depend on mere will, because they take place necessarily, or in conformity with the fixed and permanent laws of nature. Never was inconsistency more glaring ; never did a philosopher more directly contradict his own principles.

But as M. Comte's blunders can only serve to convict M. Comte himself, let us look more particularly at this supposed difficulty, which is specially experienced by the students of physical science, of reconciling moral government with the prevalence of natural law. In the statement of the difficulty, as in the passage which we have just quoted, it is assumed, *first*, that "everything," all the phenomena in the universe, are subjected to invariable laws, and that, because they are thus perfectly uniform in their recurrence, they can be predicted with unerring precision, when the laws of their uniformity are once ascertained ; *secondly*, that the phenomena which are *dependent on the will* of any being are necessarily contingent, variable, and uncertain, so that they could never be foreseen ; and therefore, *thirdly*, that the phenomena of the universe cannot be dependent on the will of a God. It would be easy to reduce this reasoning to the strict syllogistic form ; but it is unnecessary, as the point of the argument is sufficiently obvious.

We deny both the premises, and therefore reject the con-

clusion. It is not true that all the phenomena in the universe are subjected to invariable laws, so that they are perpetually recurrent after the same fashion. The variety of detail in God's creation is even more obvious, more striking, than the general uniformity of plan. The former is patent to the observation of a child; the latter can generally be detected only by the researches of science. It is because the *savans* find their sole employment in seeking out these uniformities, because they spend a lifetime in detecting and contemplating them, that they strangely come to forget the infinite variety of surface under which these uniformities were concealed. After all the boasted triumphs of science, what is irregular, diversified, inconstant, still vastly exceeds what has been reduced to uniformity and law. We do not now refer to those cases in which the classification is acknowledged to be still imperfect, the work of science not being yet completed. Take those instances in which it is most nearly completed. Extend the classification through genera, sub-genera, species, varieties, sub-varieties, — if any such be recognized; still we must come down to *individuals* at last, and then no two can be found that are precisely alike. Strictly speaking, Nature *never* repeats herself. The botanist has exhausted all the arts of comparison and classification; and yet he may safely be challenged to produce two plants, two blossoms, two leaves even, that are perfectly similar. The difference between any two is usually obvious enough, even to the naked eye; but will be surely apparent under the microscope. We must change Pope's oft-quoted line; not "Order," but *Variety* "is Heaven's *first* law." The unity of principle is usually found under the variety of detail, and therefore its discovery does not lessen, even by one, the number of cases of difference. The imperfection of our knowledge does not always lead us to suppose diversity where none really exists; it often induces us to imagine uniformity where there is nothing but variety. We must come near to detect differences in forms, sounds, or colors. It is because the planetary and stellar universe is so far off, and therefore our knowledge of it is so general and imperfect, that the dominion of law there seems to be more entire and exclusive than in the terrestrial world. We need

not multiply instances of this unbounded diversity of Nature's operations; every one's memory will supply enough of them for the purposes of this argument. Speaking generally, we may say, no two objects are ever created on precisely the same pattern, and no two events ever happened, all the circumstances of which were exactly alike. When M. Comte boasts of the power of science "to *predict with absolute precision*," let him be required to tell us how many of the next twenty children who are born in Paris will be red-haired, and how many of them will have blue eyes, aquiline noses, and thin lips.

Secondly, we deny that the phenomena which are dependent on the will of any being are therefore variable and uncertain, so that they can never be foreseen. Indeed, by asserting that they are so, M. Comte again flatly contradicts himself, and takes away the corner-stone of his own favorite science of sociology. As society is composed only of individuals, the movements and aspects of society could not be predicted, if the actions of the individual members were not, at least in certain respects, subject to law. The reality and the possibility of such sciences as politics and political economy, to say nothing of sociology, depend on the known facts that the action of men is influenced by motives, that there are certain leading motives, such as the desire of life, health, freedom, and property, which are common to all men, and therefore that the conduct of men on certain occasions, and to a limited extent, can be anticipated with full confidence that the prediction will be justified by the result. Were it not so, no general maxims could be established in political or social science, and no lessons could be derived from history. The conduct of men offers the same combination of uniformity with variety, of unity of principle underlying innumerable differences of detail, which is seen in the works of God in the external universe. According as the observer stands nearer or farther off, according as his object is to arrange and classify for the purposes of science, or to particularize for the sake of description, so will he be more struck with the evidences of order and uniformity, or with those of diversity and fluctuation. Look at great masses of men only from a distance, at which minute peculiarities are lost in the general effects, (just as the sounds

from a distant city are blended in one hollow murmur,) and they appear like machines, or rather the multitude itself seems one great machine. But examine microscopically the conduct of an individual for two successive hours, and it appears a mass of inconsistencies, motiveless alterations, and oddities that baffle all computation and foresight. We know nothing directly of M. Comte's own habits; but it is safe to affirm, that, for many years, he walked each morning from his residence to the Polytechnic School, appeared in the class-room at a fixed hour, and performed a certain unvarying round of duties. And we may be equally sure, that, in passing over the ground, on no morning did he step precisely in the foot-tracks which he had made the day before. *Will* alone, it is true, would be changeful and irregular; but will enlightened by human reason is comparatively steady and uniform in its operations; and will enlightened by infinite wisdom, we may presume, knows no change of purpose or shifting of means, but reconciles perfect order with endless variety. And such is the character both of the material and moral universe.

When M. Comte assumes, as he always does by implication while scoffing at theological faith, that whatever takes place in conformity to law also takes place *necessarily*, he is again inconsistent with himself. The principles of his philosophy rigidly exclude all idea of causation; and where there is no causation, there is no *necessary* connection. Invariable concomitance or succession is not causation; and when the idea of causation is excluded, we have no right to conclude that the succession is invariable. We can only say that the law has held good so far as our experience, or the experience of others, has extended. For aught we know, the law is one of recent introduction; for aught we know, it will soon cease to operate. The law is made known only by a process of induction, and induction is no ground of demonstration. Inductive evidence can warrant no conclusion that extends into the future.

But it will be asserted that this is extravagant scepticism; as no one, whatever he may affect to deny on theoretical considerations, can practically doubt that the laws of nature are permanent and invariable. We admit all this; we grant that

the scepticism is extravagant upon any correct view of the phenomena of nature, and of the agency which causes them. But M. Comte excludes the idea of *cause* altogether; he will allow us to study the laws of nature only as phenomenal successions or coincidences, and thereby he strikes away all ground of confidence in them as unchanging. If we attribute causation to brute matter, or assert that one phenomenon in the outward universe actually causes or produces another, then we can admit that the connection between them is *necessary*; and if we deny causation to brute matter, and attribute all changes in the material universe to the immediate agency of the Deity, we can still believe, through our confidence in Him "with whom is no variableness, neither shadow of turning," that the connection will be *uniform* and *permanent*. But the Positive Philosophy rejects both of these grounds of belief, and therefore leaves us no better reason for believing that the connection will be unceasing, than we have for thinking that two clocks, which have kept time with each other for several years, will continue apparently to regulate each other's motion, and to strike the hour together as if they were parts of one machine. M. Comte endeavors to connect himself with the necessarian or fatalist on the one hand, and with the mere observer of phenomena, who seeks not to pry into the mysteries of efficient causation, on the other. But the attempt cannot succeed. The two theories are radically inconsistent with each other, and our author must take his choice between them.

In truth, the idea of cause is not only one of those primary elements of belief, which we cannot reject without overthrowing the whole structure of human knowledge, but it is a regulative principle of the human mind, the rejection of which is inconsistent with the prosecution of any mental labor and with any fruitful study of the phenomena of the material universe. The attempt to eliminate what enters into nearly every fact of consciousness is, to borrow the language of Sir James Mackintosh, "an attempt of the mind to act without its structure, and by other laws than those to which its nature has subjected its operations." Mental labor of any sort, which is voluntary, or directed by an action of the will, is ac-

accompanied by a consciousness of effort, or of power in action, which is necessarily causative, or followed by some effect. Power in action, indeed, is a mere synonyme of causation, and is therefore *necessarily* attended by its effect. The cause and effect, in this case, are indissolubly blended in one act, and the one, therefore, cannot be even imagined without the other. This law of mental action is projected, so to speak, out of the mind upon the material universe, so that, whenever we behold a change, a beginning of existence, we necessarily attribute it to the action of some efficient cause. If we deny this principle of causality, we can no longer trust even the axioms upon which all mathematical reasoning is based; for they all rest upon the same evidence with it,—that of intuition. If we admit the principle that every event must have a cause, but deny that the cause is ever cognizable by us, we equally reject the testimony of consciousness, which assures us that the human will is a true cause,—limited indeed, but yet supreme within its own domain. That mere matter—the mere physical phenomenon—is not a real cause, is not a truth of physical science, but of metaphysical; we learn from consciousness that all truly causative action is restricted to mind, and also acquire from consciousness the tests which disprove its presence in the material universe. M. Comte is obliged to borrow the testimony of a science that he rejects, in order to build up two cardinal principles of his own system; namely, the permanency of physical laws, and the fact that our knowledge of external nature can never go beyond the observation of its phenomena, and the consequent prevision of them through their laws of coincidence or succession.

We had purposed to examine the principles of the Positive Philosophy still further, by inquiring into the details of their application to the several sciences. But the subject is an abstruse one, and our remarks upon it have already extended to so great length, that we forbear. Enough has been said to prove that so narrow and degrading a conception of the objects of inquiry, and of the principles which are applicable to the investigation of the laws of nature, can lead only to measure and profitless results in every department of science. It is not a scheme of philosophy which is likely to find many pros-

elytes, or to enjoy any other than a temporary notoriety. It has been received, as we have seen, with but little favor in France, and Miss Martineau's efforts are not likely to obtain for it much currency in England. Even the controversy which it has evoked cannot much retard its progress to oblivion.

ART. X. — *Annual of Scientific Discovery: or, Year-Book of Facts in Science and Art, for 1854. Exhibiting the most important Discoveries and Improvements in Mechanics, Useful Arts, Natural Philosophy, Chemistry, Astronomy, Meteorology, Zoölogy, Botany, Mineralogy, Geology, Geography, Antiquities, &c.; together with a List of recent Scientific Publications; A Classified List of Patents; Obituaries of Eminent Scientific Men; Notes on the Progress of Science during the Year 1853, etc.* Edited by DAVID A. WELLS, A. M. Boston: Gould & Lincoln. 1854. 12mo. pp. 398.

FEW or none of the centuries prior to the eighteenth could have furnished for a book like this so copious materials as are now afforded in the lapse of a single year. The last year, indeed, was marked by no one world-famous invention or discovery; but it gave birth to unnumbered new applications of known principles and new corollaries from established premises. In earlier times science and art respectively characterized not the same, but successive ages. The great men of one epoch wrought from within outward in enlarged generalizations, annexing new provinces to the domain of knowledge, or arrested for analysis laws or agencies of the material universe which had eluded previous research. Their successors for more than one generation were then employed in colonizing the newly annexed territory by contrivances of practical utility, and in giving concrete shape to abstract formulæ. Indeed, the two processes belong to widely different classes of minds, which demand very unlike influences for their development, and which (whether contemporaneously or otherwise) coöperate as the stamens and pistils of a plant do in elaborating